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education

Department:
Education
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

PROVINCIAL ASSESSMENT/
PROVINSIALE ASSESSERING

GRADE/GRAAD 11

MATHEMATICS P2/*WISKUNDE V2*

NOVEMBER 2024

MARKING GUIDELINES/ *NASIENRIGLYNE*

MARKS/*PUNTE*: 150

These marking guidelines consist of 17 pages./
Hierdie nasienriglyne bestaan uit 17 bladsye.

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NOTE:

- If a candidate answers a question TWICE, only mark the FIRST attempt.
- If a candidate has crossed out an attempt of a question and not redone the question, mark the crossed out version.
- Consistent accuracy applies in ALL aspects of Marking Guidelines. Stop marking at the second calculation error.
- Assuming answers/values in order to solve a problem is NOT acceptable.

NOTA:

- *As 'n kandidaat 'n vraag TWEE KEER beantwoord, merk slegs die EERSTE poging.*
- *As 'n kandidaat 'n antwoord van 'n vraag doodtrek en nie oordoen nie, merk die doodgetrekte poging.*
- *Volgehoue akkuraatheid word in ALLE aspekte van Nasienriglyne toegepas. Hou op nasien by die tweede berekeningsfout.*
- *Aanvaar van antwoorde/waardes om 'n probleem op te los, word NIE toegelaat NIE.*

GEOMETRY / *MEETKUNDE*	
S	**A mark for correct statement** **(A statement mark is indepenent of a reason)**
	'n Punt vir 'n korrekte bewering ***('n Punt vir 'n bewering is onafhanklik van die rede)***
R	**A mark for the correct reason.** **(A reason mark may only be awarded if the statement is correct)**
	'n Punt vir 'n korrekte rede ***('n Punt word slegs vir die rede toegeken as die bewering korrek is)***
S/R	**Award a mark if statement AND reason are both correct**
	Ken 'n punt toe as die bewering EN rede beide korrek is

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QUESTION/*VRAAG 1*

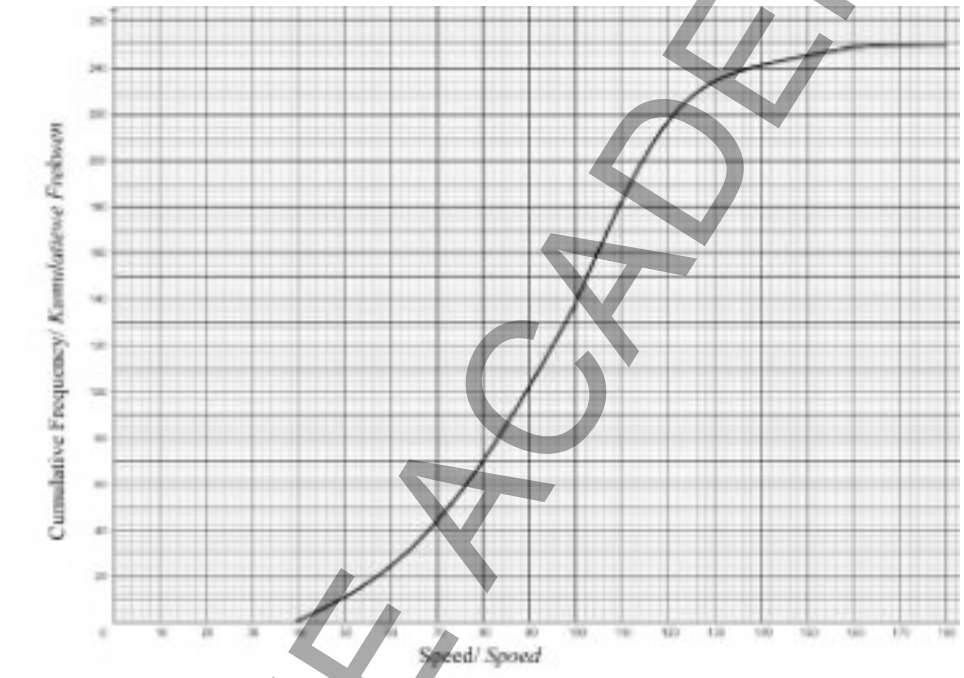
18, 26, 25, 18, 16, 12 ,10, 8, 18, 17, 8

1.1	Mean/ *Gemiddeld* $= \frac{176}{11}$ $= 16$	✓ sum/*som* ✓ answer/*antwoord* answer only: full marks (2)
1.2	$\sigma = 5{,}83$	✓ $\sigma = 5{,}83$ (1)
1.3	Interval = 16 + 5,83 = 21,83 ∴ 2 of the taxis are overloaded/ *van die taxi's was oorlaai.*	✓ interval ✓ answer/ *antwoord* (2)
1.4.1	Skewed to the left. / *Skeef na links.* $\bar{x} < Q_2$	✓ answer/ *antwoord* (1)
1.4.2	75%	✓ answer/ *antwoord* (1)
1.4.3	*x, 8, 8, 10, 12, 13, 16, 17, 18, 18, 18, 18, y, 20, 25, 26* $Q_3 = 19$ $\therefore \frac{3(16+1)}{4} = 12{,}75^{th}$ position/ *posisie* Between/ *tussen* 12th and/ *en* 13th position/ *posisie* $\frac{18+y}{2} = 19$ $\therefore y = 20$ New/ *nuwe* $\bar{x}$: $\frac{247+x}{16} = 16$ $\therefore x = 9$	✓ Q_3: $\frac{3(16+1)}{4} = 12{,}75^{th}$ position/ *posisie* ✓ $y = 20$ ✓ $\bar{x}$: $\frac{247+x}{16} = 16$ ✓ $x = 9$ (4)
		[11]

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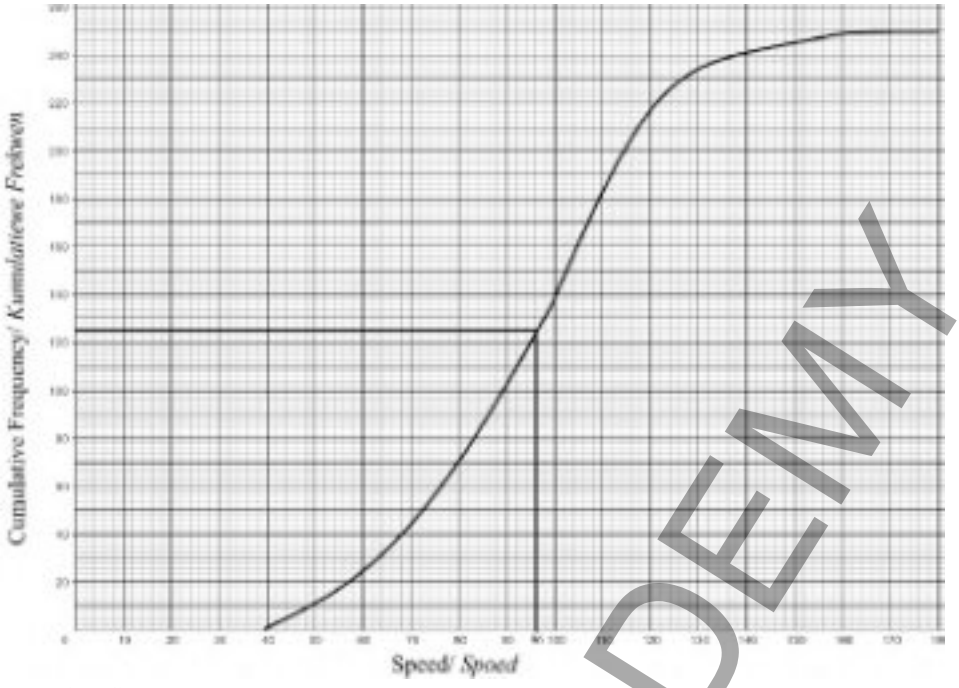
QUESTION/*VRAAG 2*

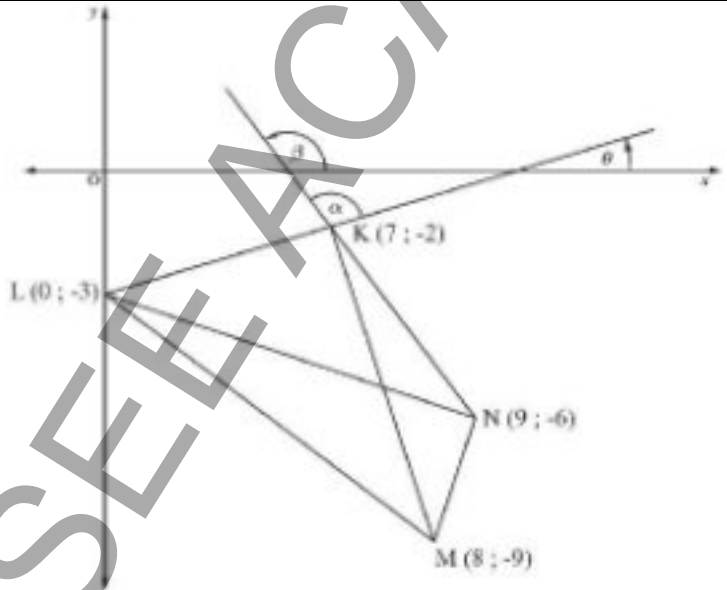
2.1	SPEED (d) (in km/h) / FREQUENCY (number of vehicles) / CUMULATIVE FREQUENCY	
	$40 < d \leq 60$ / 25 / 25	✓ 25, 71, 138 ✓ 217, 241, 249, 250 (2)
	$60 < d \leq 80$ / 46 / 71	
	$80 < d \leq 100$ / 67 / 138	
	$100 < d \leq 120$ / 79 / 217	
	$120 < d \leq 140$ / 24 / 241	
	$140 < d \leq 160$ / 8 / 249	
	$160 < d \leq 180$ / 1 / 250	
2.2	250 vehicles/ *voertuie*	✓ answer (1)
2.3		✓ Grounding/ *grond* (40;0) ✓ Using upper intervals/ *gebruik boonste intervalle* ✓ End at/ *eindig by* (180;250) ✓ shape/ *vorm* (4)

QUESTION/*VRAAG 3*

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2.4	Median at/ *mediaan by* 125  ∴ 96 km/h Accept/ *aanvaar* (90 - 100)	✓✓ answer (2)
		[9]



3.1	$m_{KN} = \dfrac{-6-(-2)}{9-7}$ $m_{KN} = -2$	✓correct substitution into gradient formula *korrekte vervanging in gradiënt formule* ✓ $m_{AC} = 2$ (2)
3.2	$y - y_1 = m(x - x_1)$ $y-(-2) = -2(x-7)$ $y+2 = -2x+14$ $y = -2x+12$ **OR/OF** $y = -2x+c$ $-2 = -2(7)+c$ $c = 12$ $y = -2x+12$	✓subst./*vervang* (7 ; -2) ✓ $y = -2x+12$ (2)

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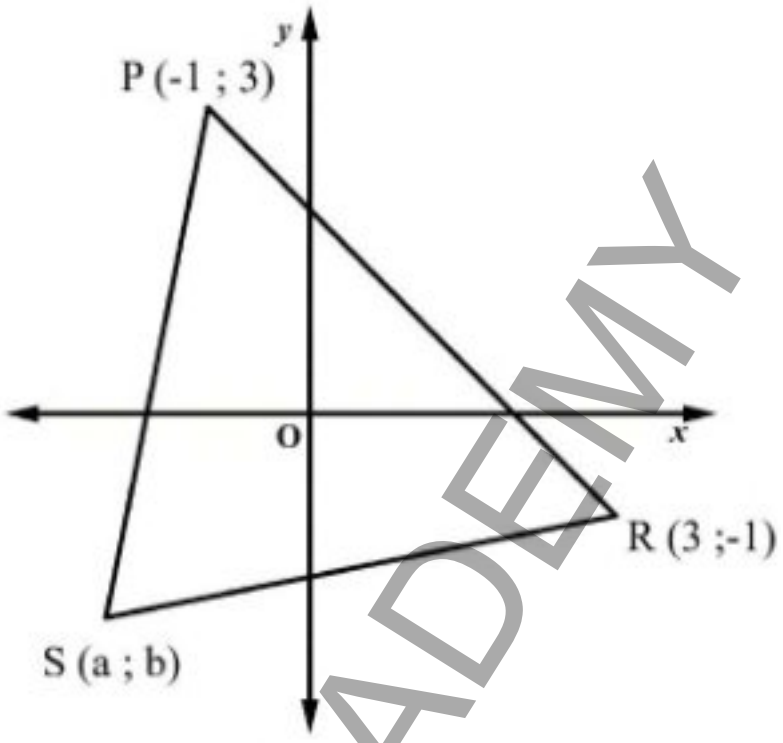
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3.3	$\tan\beta = m_{KN}$ $= -2$ $\beta = 180° - 63{,}43°$ $\beta = 116{,}57°$	✓ $\tan\beta = -2$ ✓Ref $\angle$/*Verw* $\angle$=63,43° ✓ $\beta = 116{,}57°$ (3)
3.4	$m_{KL} = \frac{-2-(-3)}{7-0}$ $m_{KL} = \frac{1}{7}$ $\tan\theta = \frac{1}{7}$ $\theta = 8{,}13°$ $\alpha = 116{,}57° - 8{,}13°$ [ext $\angle$ of Δ/ *buite* $\angle$ *van* Δ] $\alpha = 108{,}44°$	✓ $m_{KL} = \frac{1}{7}$ ✓ $\tan\theta = \frac{1}{7}$ ✓ $\theta = 8{,}13°$ ✓ $\alpha = 108{,}44°$ (4)
3.5	$m_{KM} = \frac{-9-(-2)}{8-7}$ $m_{KM} = -7$ $m_{KL} = \frac{1}{7}$ $-7 \times \frac{1}{7} = -1$ $\therefore m_{KM} \times m_{KL} = -1$ $\therefore KL \perp KM$	✓ $m_{KM} = -7$ ✓ $-7 \times \frac{1}{7} = -1$ (2)
3.6	$m_{LN} = \frac{-6-(-3)}{9-0}$ $m_{LN} = -\frac{1}{3}$ $m_{MN} = \frac{-9-(-6)}{8-9}$ $m_{MN} = 3$ $3 \times -\frac{1}{3} = -1$ $\therefore m_{LN} \times m_{MN} = -1$ $\therefore LN \perp NM$ $\therefore L\hat{N}M = 90°$ But/ *maar* $KL \perp KM$ $\therefore L\hat{K}M = 90°$ $\therefore L\hat{K}M = L\hat{N}M = 90°$ ∴ KLMN is cycliq quadrilateral/ *koordevierhoek* ...[**converse** $\angle$ s in the same segment/***omgekeerde*** $\angle$ e *in dieselfde segment*] **OR/OF** [**line** substend equal $\angle$ s / ***lyn*** *onderspan gelyke* $\angle$ e]	✓ $m_{LN} = -\frac{1}{3}$ ✓ $m_{MN} = 3$ ✓ $L\hat{N}M = 90°$ ✓ $L\hat{N}M = L\hat{K}M = 90°$ ✓reason/*rede* (5)
		[18]

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QUESTION/*VRAAG 4*



4.1	$T\left(\frac{-1+3}{2};\frac{3-1)}{2}\right)$ T (1 ; 1)	✓ $x = 1$ ✓ $y =$ (2)
4.2	$d_{PR} = \sqrt{(-1-3)^2 + (3-(-1))^2}$ $d_{PR} = 4\sqrt{2}$	✓correct subst in distance formula/ *korrekte vervanging in afstandsformule.* ✓ $d_{PR} = 4\sqrt{2}$ (2)
4.3	$m_{PR} \times m_2 = -1$ $(-1)\times(m_2) = -1$ $\therefore m_2 = 1$ $y - y_1 = m(x - x_1)$ $y - (1) = 1(x - 1)$ $y - 1 = x - 1$ $y = x$ **OR/OF** $y = 1x + c$ $1 = 1(1) + c$ $c = 0$ $y = x$	✓ $m_{ST} = 1$ ✓subst./*vervang* (1 ; 1) ✓ $y = x$ (3)
4.4	Subst/ *vervang* (a ; b) in $y = x$ $y = x$ $\therefore a = b$	✓ Subst/ *vervang* (a ; b) in $y = x$ (1)

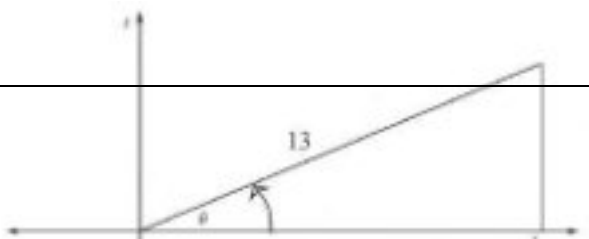
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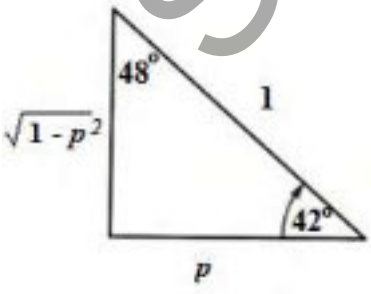
4.5	$Area\Delta PRS = \frac{1}{2}PR.TS$ $12 = \frac{1}{2}\times 4\sqrt{2}\times\sqrt{(a-1)^2+(b-1)^2}$ $3\sqrt{2} = \sqrt{(a-1)^2+(b-1)^2}$ $18 = (a-1)^2+(b-1)^2$ but/ *maar* $a = b$ $\therefore 18 = (a-1)^2+(a-1)^2$ $18 = 2(a-1)^2$ or/*of* $0 = a^2-2a+1-9$ $9 = (a-1)^2$ $0 = a^2-2a-8$ $a-1 = \pm\sqrt{9}$ $0 = (a-4)(a+2)$ $a = 4 / a = -2$ but/ *maar* $a < 0$ $\therefore a-1 = -3$ $\therefore a = -2$ $\therefore S(-2;-2)$	✓Subst. in Area formula/ *vervang in Opp formule* ✓ square both sides/ *kwadreer beide kante* ✓ Subst/ *vervang a = b* ✓ $a-1=-3$ or/*of* a=4 ✓ S(-2 ; -2) (5)
		[13]

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QUESTION/*VRAAG 5*

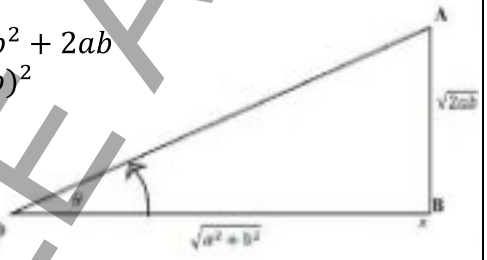
5.1		

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	$(12)^2 + y^2 = (13)^2$ $y^2 = 25$ $y = 5$ $\frac{3\cos(360° - \theta) + 2\sin(360° - \theta)}{\frac{1}{5}\tan(180° + \theta)}$ $= \frac{3\cos\theta - 2\sin\theta}{\frac{1}{5}\tan\theta}$ $= \frac{3\left(\frac{12}{13}\right) - 2\left(\frac{5}{13}\right)}{\frac{1}{5}\left(\frac{5}{12}\right)}$ $= \frac{\frac{36}{13} - \frac{10}{13}}{\frac{1}{12}}$ $= \frac{26}{13} \times \frac{12}{1}$ $= 24$	✓$y = 5$ ✓ $3\cos\theta$ ✓$-2\sin\theta$ ✓ $\frac{1}{5}\tan\theta$ ✓ $3\left(\frac{12}{13}\right) - 2\left(\frac{5}{13}\right)$ ✓ $\frac{1}{5}\left(\frac{5}{12}\right)$ ✓ answer/*antwoord* (7)
5.2	$\frac{\tan 135° . sin210°}{cos660° + cos180°}$ $= \frac{(-\tan 45°).(-sin30°)}{\cos 60° - 1}$ $= \frac{(-1)(-\frac{1}{2})}{(\frac{1}{2}) - 1}$ $= -1$	✓$-\tan 45°$ ✓$-sin30°$ ✓$\cos 60°$ ✓-1 ✓ $\frac{(-1)(-\frac{1}{2})}{(\frac{1}{2}) - 1}$ ✓ answer/*antwoord* (6)
5.3		
5.3.1	$cos138°$ $= -cos42°$ $= -p$	✓$-cos42°$ ✓$-p$ (2)

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5.3.2	$3sin48°$ $= 3p$	✓✓$3p$ (2)
5.3.3	$sin(-2202°)$ $= \sin(-42°)$ $= -\sin 42°$ $= -\sqrt{1-p^2}$	✓$\sin(-42°)$ ✓ diagram ✓$-\sqrt{1-p^2}$ (3)
5.4	$\frac{\sin x}{1+cosx} + \frac{1}{tanx} = \frac{1}{sinx}$ LH: $\frac{sinx}{1+cosx} + 1 \div \left(\frac{sinx}{cosx}\right)$ $= \frac{sinx}{1+cosx} + 1 \times \left(\frac{cosx}{sinx}\right)$ $= \frac{sin^2x+cosx(1+cosx)}{sinx(1+cosx)}$ $= \frac{sin^2x+cosx+cos^2x}{sinx(1+cosx)}$ $= \frac{1+cosx}{sinx(1+cosx)}$ $= \frac{1}{sinx}$ LH = RH	✓$tanx = \frac{sinx}{cosx}$ ✓$\frac{1}{tanx} = \frac{cosx}{sinx}$ ✓numerator/ *noemer* $sinx(1+cosx)$ ✓$sin^2x + cosx + cos^2x$ ✓$sin^2x + cos^2x = 1$ ✓$\frac{1+cosx}{sinx(1+cosx)}$ (6)
5.5	$tan^2\theta = \frac{2ab}{a^2+b^2}$ $\therefore tan\theta = \sqrt{\frac{2ab}{a^2+b^2}} \ldots.(0° < \theta < 90°)$ But/ *maar* $OA^2 = OB^2 + AB^2$ $= a^2 + b^2 + 2ab$ $= (a+b)^2$ $\therefore OA = a + b$ $\therefore sin\theta = \frac{\sqrt{2ab}}{a+b}$  	✓ $tan^2\theta = \frac{2ab}{a^2+b^2}$ ✓ $tan\theta = \sqrt{\frac{2ab}{a^2+b^2}}$ ✓ Pythagoras ✓ $OA = a + b$ ✓ $sin\theta = \frac{\sqrt{2ab}}{a+b}$ (5)
		[31]

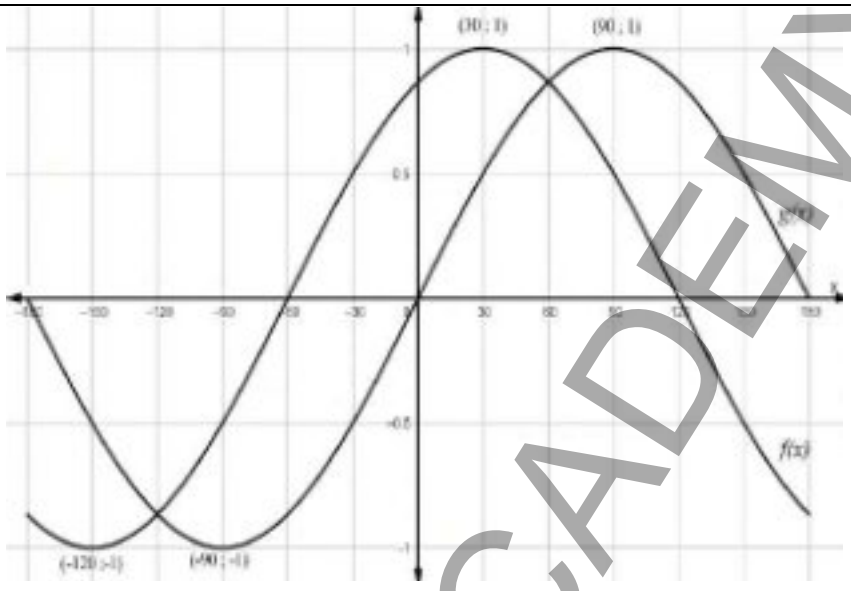
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QUESTION/*VRAAG 6*

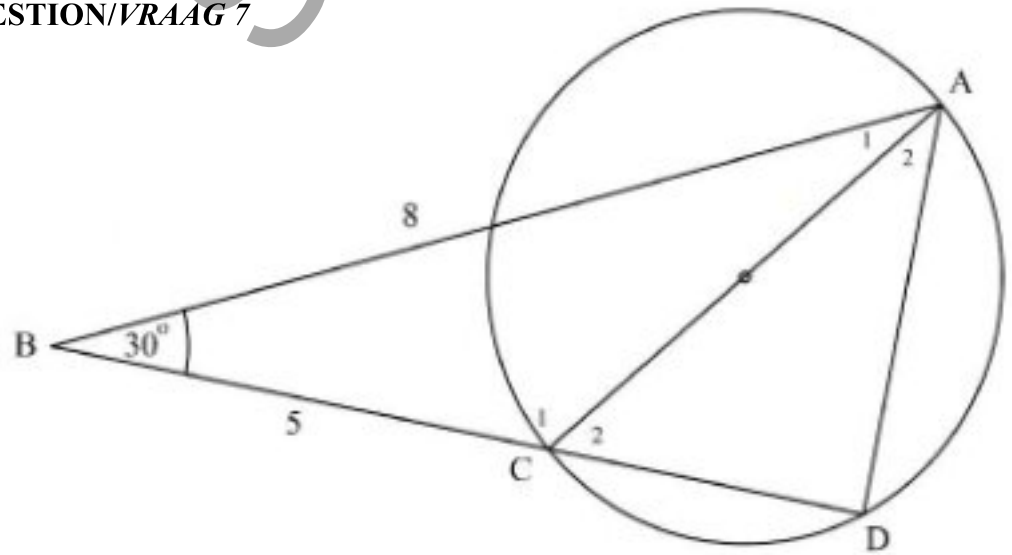
6.1	$\cos(x-30°) = \sin x$ $\cos(x-30°) = \cos(90°-x)$ *I* $x-30° = 90°-x+k.360°; k \in Z$ $2x = 120°+k.360°;\ \ k \in Z$ $x = 60°+k.180°, k \in Z$ $x\epsilon\{-120°; 60°\}$ **OR/OF** *IV* $x-30° = 360-(90°-x)+k.360°; k \in Z$ No solution/ *geen oplossing*	✓$\sin x = \cos(90°-x)$ ✓$x-30° = 90°-x+k.360°$ ✓$x = 60°+k.180°$ ✓ $k \in Z$ ✓$x\epsilon\{-120°; 60°\}$ **OR/OF** ✓$\cos(x-30) = \sin(120°-x)$

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	$\cos(x-30°)=\sin x$ $\sin(90°-x+30°)=\sin x$ *I* $120°-x=x+k.360°;k\in Z$ $-2x=-120°+k.360°;\quad k\in Z$ $x=60°+k.180°;\quad k\in Z$ *II* $120°-x=180°-x+k.360°;k\in Z$ No solution/ *geen oplossing* $x\epsilon\{-120°;60°\}$	✓$120°-x=x+k.360°$ ✓$x=60°+k.180°$ ✓ $k\in Z$ ✓ $x\epsilon\{-120°;60°\}$ (5)
6.2		for/*vir f(x)* : ✓Shape/*vorm* ✓intercepts with axes/ *afsnitte met asse* ✓Turning points/ *draaipunte* for/*vir g(x)* ✓shape/*vorm* ✓intercepts with axes/ *afsnitte met asse* and turning points/ *draaipunte* (5)
6.3	$f(x)\le g(x)$ $60°\le x\le 180°$ **OR/OF** $x\in[60°;180°]$	✓interval ✓notation/ *notasie* (2)
		[12]

QUESTION/*VRAAG 7*

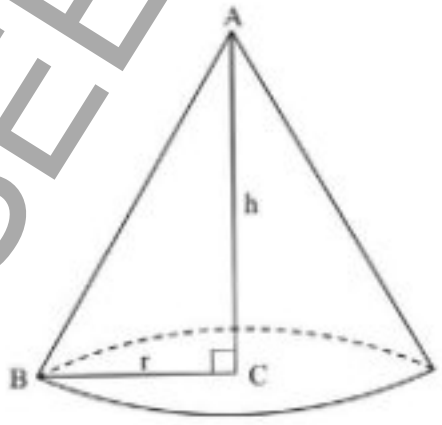


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7.1	$AC^2 = AB^2 + BC^2 - 2(AB)(BC)\cos\hat{B}$ $AC^2 = 8^2 + 5^2 - 2(8)(5)\cos 30°$ $AC = \sqrt{19{,}71796\ldots}$ $AC = 4{,}44$	✓subst. correctly into cos rule/ *vervang korrek in cos-reël.* ✓ $AC = \sqrt{19{,}71796}$ (2)
7.2.1	$\frac{\sin \hat{A}_1}{5} = \frac{\sin 30°}{4{,}44}$ $\sin \hat{A}_1 = \frac{5\sin 30°}{4{,}44}$ $\hat{A}_1 = 34{,}27°$	✓ subst. correctly into sin rule/ *vervang korrek in sin-reël.* ✓ $\hat{A}_1 = 34{,}27°$ (2)
7.2.2	$\hat{C}_2 = 30° + 34{,}27°$ .....ext angle of Δ/ *buite hoek van* Δ $\hat{C}_2 = 64{,}27°$	✓$\hat{C}_2 = 64{,}27°$ (1)
7.2.3	$\hat{D} = 90°$ [∠ in semi circle/ ∠ *in halwe sirkel*] $sin\ 64{,}27° = \frac{AD}{4{,}44}$ $AD = 4$	✓ $\hat{D} = 90°$ ✓$sin\ 64{,}27° = \frac{AD}{4{,}44}$ ✓$AD = 4$ (3)
		[8]

QUESTION/*VRAAG 8*



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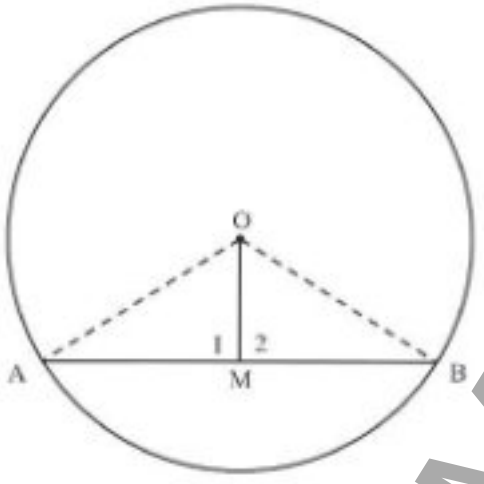
8.1	$2\pi r = 245$ $\therefore r = \frac{245}{2\pi}$ $r = 39$ m In ΔABC: $\frac{h}{r} = tan50°$ $\therefore h = 39.tan50°$ $\therefore h = 46{,}5\ m$	✓ $r = 39$m ✓$\frac{h}{r} = tan50°$ ✓ $h = 46{,}5\ m$ (3)
8.2	$Volume = \frac{1}{3}\pi r^2 h$ $= \frac{1}{3}\pi(39)^2.46{,}5$ $= 74065\ m^3$	✓ $\frac{1}{3}\pi r^2 h$ ✓$\frac{1}{3}\pi(39)^2.46{,}5$ ✓$74065\ m^3$ (3)
		[6]

QUESTION/*VRAAG 9*

9.1	

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NOTE: If candidate fails to draw the construction or indicate the construction, it is an immediate BREAK DOWN. 0/5 marks.

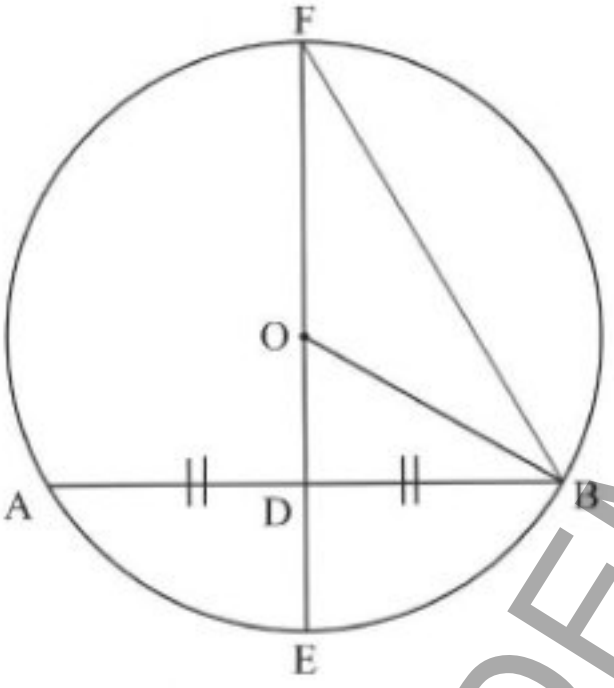
NOTA: Indien kandidaat nie die konstruksie teken of aandui dat 'n konstruksie plaasvind nie, is dit 'n onmiddellike "BREAK DOWN" en daar word nie verder gemerk nie. 0/5 punte.

9.1	Construction: Connect AO and OB *Konstruksie: Verbind AO en OB* In ΔAOM and ΔBOM: 1. $AO = BO$ (Radii) 2. $OM = OM$ (Common side/ *Gemeenskaplike sy)* 3. $AM = MB$ (Given/ *Gegee*) $\therefore \Delta AOM \equiv \Delta BOM$ (S S S) $\therefore \hat{M}_1 = \hat{M}_2$ But/ *maar* $\hat{M}_1 + \hat{M}_2 = 180°$ (AMB is a straight line/ *'n reguitlyn)* $\therefore \hat{M}_1 = \hat{M}_2 = 90°$ $\therefore$ OM⊥AB	✓ construction/ *konstruksie* ✓S ✓R ✓S/R ✓S/R ✓S/R (5)

QUESTION/*VRAAG 10*

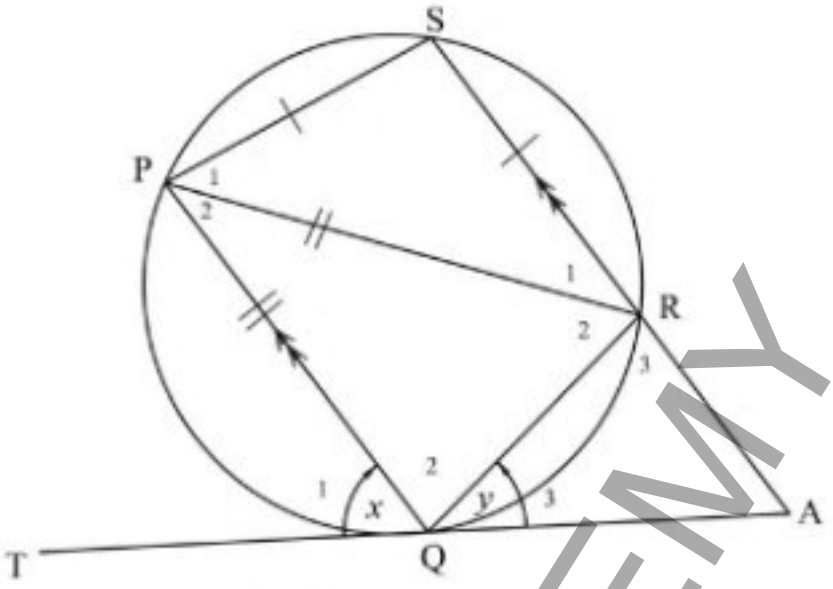
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9.2		
9.2.1	OD ⊥ AB [line from center to midpoint of chord/ *lyn vanaf mid.punt van sirkel na middelpunt van koord.*] $OD^2 = OB^2 - DB^2$ Pythagoras $OD^2 = 20^2 - 12^2$ $OD = \sqrt{256}$ $OD = 16$ $\therefore DE = 20 - 16$ = 4 mm	✓S&R ✓$OD^2 = 20^2 - 12^2$ ✓$OD = 16$ ✓DE = 4 mm (4)
9.2.2	$FD = 20 + 16$ $FD = 36$ mm $FB^2 = 36^2 + 12^2$ Pythagoras $FB = \sqrt{1440}$ $FB = 37{,}95$ mm	✓FD = 36 mm ✓$FB^2 = 36^2 + 12^2$ ✓$FB = 37{,}95$ mm (3)
		[12]

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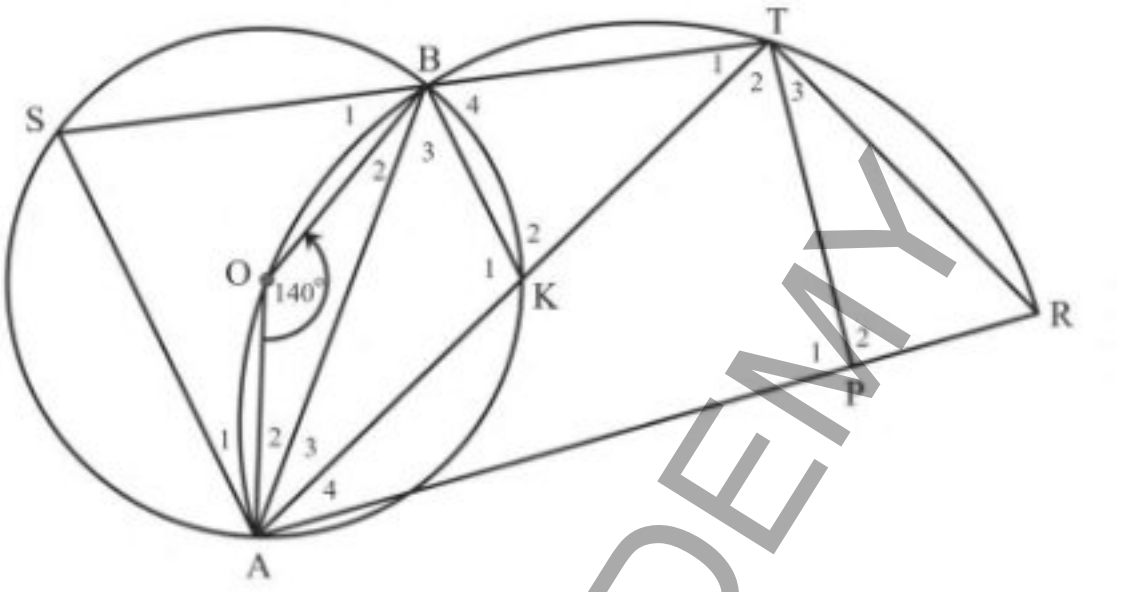


10.1	$\hat{P}_2 = y$ [tangent chord theorem /*raaklyn-koordstelling*] $\hat{R}_1 = y$ [alt ∠s / *verw ∠e; SR//PQ*] $\hat{P}_1 = y$ [∠s opp equal sides/ *∠e teenoor gelyke sye*]	✓S✓R ✓S✓R ✓S✓R (6)
10.2	$\hat{R}_2 = x$ [tangent chord theorem /*raaklyn-koordstelling*] $\hat{Q}_2 = x$ [∠s opp equal sides/ *∠e teenoor gelyke sye*] $\hat{R}_3 = x$ [alt ∠s / *verw ∠e; SR//PQ*]	✓S✓R ✓S/R ✓S/R (4)
10.3	$\hat{S} = 180° - x$ [opp ∠s of cyclic quad/ *t.o. ∠e van KVH*]	✓R (1)
10.4	$\hat{Q}_1 + \hat{Q}_2 + \hat{Q}_3 = 180°$ [∠s on a str line/ *∠e op reguitlyn*] $x + x + y = 180°$ $y = 180° - 2x$ .....*(1)* $\hat{P}_1 + \hat{R}_1 + \hat{S} = 180°$ [∠s in a Δ] $y + y + 180° - x = 180°$ $2y = x$ .... *(2)* Subt *(1)* in *(2)* $2(180° - 2x) = x$ $360° - 4x = x$ $360° = 5x$ $x = 72°$ $\therefore y = 180° - 2(72°)$ $y = 36°$	✓S/R ✓ $y = 180° - 2x$ ✓S/R ✓ $2y = x$ ✓x -value/ *waarde* ✓y -value/ *waarde* (6)
		[17]

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QUESTION/*VRAAG 11*



11.1	$\hat{S} = 70°$ [angle at centre = 2 × ∠at circumference/ *middelpunts ∠ = 2 × omtreks ∠*]	✓S✓R (2)
11.2	$\hat{K}_2 = \hat{S} = 70°$ [ext ∠ of cyclic quad/ *buite ∠ van KVH*] $\hat{T}_1 = 40°$ [opp ∠s of cyclic quad = 180°/ *t.o ∠e van KVH* = 180°] $\hat{B}_4 = 70°$ [∠s in a Δ] $\therefore \hat{B}_4 = \hat{S}$ But angles lie corresponding/ *hoeke lê ooreenkomstig* $\therefore AS \parallel KB$	✓S✓R ✓S/R ✓S ✓R (5)
11.3	$A\hat{T}R = 90°$ [∠ in semi circle/ ∠ *in halwe sirkel*]	✓S✓R (2)
11.4	$\hat{P}_2 = 80°$ [∠s opp equal sides/ *∠e teenoor gelyke sye*] $\hat{T}_3 = 20°$ [∠s in a Δ] $\therefore \hat{T}_2 = 70°$ $\therefore \hat{T}_2 = \hat{B}_4 = 70°$ ∴ BK is a tangent/ *raaklyn...* **converse** tan chord theorem/ ***omgekeerde*** *raaklyn-koord stelling*] **OR/OF** [∠ between **line** and chord/ ∠ *tussen **lyn** en koord*]	✓S ✓S ✓S ✓R (4)
		[13]
	TOTAL/ *TOTAAL*:	**150**

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